Katadyn – Mini Microfilter

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Device Information

The Katadyn Mini Microfilter is a handheld pump water treatment device utilizing ceramic microfiltration. The ceramic element is a field cleanable 0.2 µm depth filter with silver impregnation. This device is designed for bacteria and cyst reduction, but contains no reduction mechanism for virus. The manufacturer recommends a chemical disinfectant be added if viruses are suspected in the water source. The device consists of a plastic housing and pump, ceramic filter element, inlet and outlet tubing, tubing float, and pre-filter. Additionally, the device comes with a filter element scrubbing pad, ceramic element measuring gauge, pump lubricant, and storage bag. The weighted pre-filter and float work to keep the inlet tubing submerged, yet off of the bottom of the raw water source to limit the introduction of sediment. The ceramic element silver impregnation is designed to limit bacterial growth on the element. This device creates an absolute barrier to contaminants greater than the pore size. No chemicals and no wait time are required for use. Prior to first use, and after prolonged storage, the manufacturer recommends discarding a small amount of water to reduce stale taste. This device is fully field-serviceable, and can be disassembled without tools. Additionally, Katadyn offers a carbon cartridge bottle attachment that can be added to the effluent tubing for taste and odor reduction.

Effectiveness Against Microbial Pathogens

No results were obtained that challenged this device strict to the requirements of the U.S. Environmental Protection Agency (USEPA) Guide Standard and Protocol for Testing Microbiological Water Purifiers (reference 1). Results from an independent laboratory study (reference 2) were reviewed that challenged the Katadyn Mini against a modified version of reference 1. No information was supplied as to the flow rate used during testing, and total production during testing was 200 L. Under these modified protocol conditions, data showed that this device is capable of meeting the log reduction requirements for bacteria and *Cryptosporidium* oocysts. This testing did not challenge the device against *Giardia* cysts or virus. Since the primary reduction mechanism is size exclusion, and because *Giardia* cysts are larger in size than C*ryptosporidium* oocysts, similar results for *Giardia* reduction can be assumed. Viruses are too small to be removed by this filtration device. Very little information was received on the testing procedure. It was noted that during testing, this device required cleaning with the supplied scouring pad at every test point, stating also that the device tended to clog very easily. Results state that flow improved considerably after cleaning but that as more water was passed through the device, cleaning was required more often. Due to the testing modifications with respect to reference 1, this evaluation based reduction capabilities on

treatment technology. Therefore, this device is assigned one √ for bacteria and cyst reduction (for an explanation of the rating checks click here) based on size exclusion by the ceramic microfilter. Since the device is not designed, and has no mechanism for virus reduction, the device is assigned one X for this pathogen. Additional treatment is required for virus reduction.

Table. Expected Performance Against Microbial Pathogens.

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Pathogen Reduction Mechanism
Bacteria	>6 log	√	size exclusion
Viruses	not effective*	X	none
Giardia cysts	>3 log	√	size exclusion
Cryptosporidium oocysts	>3 log	√	size exclusion

* Additional treatment required for virus reduction.

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. The manufacturer stated production capacity of the device is up to 2,000 L at a rate of 0.5 L/min. Since cleaning irreversibly decreases the size of the element, the overall capacity of this device will vary widely with raw water turbidity. No data was received showing the number of times this device can be cleaned before ceramic element replacement is required. Additionally, since the available data only processed 200 L, and with no indication of challenge water turbidity, no estimation of actual production capacity can be made.

Cleaning, Replacement, and End of Life Indicator

This device utilizes a ceramic depth microfilter which can be cleaned by scrubbing the surface of the filter element to remove accumulated debris. Given the small pore size of the ceramic element, it is expected to clog frequently during use with turbid waters and is therefore designed to be cleaned multiple times throughout its useful life. As stated above, the device underwent multiple cleanings during the 200 L microbial challenge testing. The report (reference 2) states that cleaning restored the production rate considerably and did not affect pathogen reductions. Supplied with the device is a gauge that is placed over the ceramic element. If the gauge fits around the element then the filter has been cleaned to its capacity and must be replaced. Since

the device works solely on size exclusion, as long as the device will process water and the element is not determined to be too thin, stated pathogen reductions should be valid. When the filter begins to clog and pumping difficulty increases the user should discontinue use and clean the ceramic element. This device does not contain a pressure relief valve, allowing for the possibility of the user over pressurizing the filter and damaging the seals.

Weight and Size

Katadyn Mini Microfilter	230 grams
Size (height x width x length)	4 cm x 8 cm x 18 cm
Tubing	74 cm

Cost

Katadyn Mini Microfilter	$90.00
Replacement Ceramic Element	$50.00

Device Evaluation

The Katadyn Mini Microfilter utilizes a 0.2 µm silver impregnated ceramic element for the reduction of bacteria and cysts. The silver impregnation is designed to limit microbial growth on the ceramic element. No data was received regarding the efficacy of this bacteriostatic design. Microbial reduction data reviewed for this device (reference 2), tested against an abbreviated version of the USEPA Guide Standard and Protocol for Testing Microbiological Water Purifiers (reference 1), showed that this device is capable of reducing bacteria by >6 log, and cysts by >3 log. No information was given as to the exact testing conditions and the volume of water treated during testing was far less than the stated capacity of the device. This device contains no virus reduction mechanism and therefore no testing was performed for this pathogen. Additional treatment is required to fully meet the requirements of reference 1 and ensure adequate reduction of all three classes of micro-organism. Since size exclusion by ceramic microfilter elements is a generally accepted mechanism for pathogen reduction, we expect this device to adequately reduce bacteria and cysts in accordance with reference 1 and recommend additional treatment for virus reduction (reference 3). The testing results received note the requirement for multiple cleanings. Due to the small pore size, ceramic element cleaning is expected, increasing in frequency with increasing raw water turbidity. Results showed consistent pathogen reductions after cleaning (reference 2). It is expected that pathogen reductions will remain consistent throughout the useful life of the device. This device utilizes no chemicals and requires no wait time prior to water consumption. There is no indicator of process failure. A plastic gauge acts as an end of device useful life indicator. Since, during cleaning of the ceramic element the filter

reduces size, when the gauge fits around the filter it must be replaced. This device, like all containing ceramic elements, must not be frozen while wet. Expansion of the water during freezing may crack the element. Additionally, the user should avoid shocking the device due to the brittle nature of ceramic elements and possible fracturing during shock loads. No manufacturing information or quality control data was received for this device. The manufacturer states ISO 9000 certification. No information was received on the storage life or required storage conditions for this device.

Advantages

- Based on treatment technology and independent data reviewed, this device should be capable of reducing bacteria and cysts to within the requirements of the USEPA Guide Standard and Protocol for Testing Microbiological Water Purifiers (reference 1).
- No wait time prior to water consumption.
- Field-serviceable.
- Simple and lightweight.
- End of device useful life indicator.

Disadvantages

- Device is not designed for virus reduction and therefore unable to fully meet the pathogen reduction requirements of the USEPA Guide Standard and Protocol for Testing Microbiological Water Purifiers (reference 1).
- Additional treatment required.
- Small pore size of filter makes device inherently susceptible to clogging by waters with elevated turbidities.
- Ceramic element fragile to shock loads and freezing.
- No real-time indicator of process failure.

References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.

2. Independent laboratory results of tests showing bacteria and cyst reduction. 1995. Provided by Katadyn.

3. U.S. Army Center for Health Promotion and Preventive Medicine, 2005. *Technical Information Paper; Filtration in the Use of Individual Water Purification Devices*, Aberdeen Proving Ground, MD.